4.0

SAFETY AND RELIABILITY

4.1 FACILITY SAFETY

4.1.1 Natural Hazards

The two primary natural hazards of potential concern to a generating plant located in the project area are seismic risk and flooding. The risks of these natural hazards and the design measures being used to offset these risks are discussed in this section. The proposed mitigation measures ensure that natural hazards do not pose a significant risk to the MPP.

4.1.1.1 Seismic Hazards

The site seismicity is discussed in detail in Section 3.3.2, Geologic Setting and Seismology.

Southern California is a seismically active region that can be expected to experience strong seismic shaking from future earthquakes generated by active faults. Earthquakes that will produce strong shaking at the MPP site may occur on mapped active or potentially active faults in the region, or on faults with little or no surface expression. There are several mapped and inferred faults that have been active in the late Quaternary in the vicinity of the MPP site. Based on the known activity of faults in the region and on the recorded seismicity, the MPP site is likely to experience strong ground shaking from future earthquakes.

Design and construction of the facilities will be in conformance with current California Building Code Seismic Zone 4 requirements. The structural and seismic design criteria for the project are included in Appendix B (Structural and Seismic Engineering Design Criteria).

4.1.1.2 Flooding

The Los Angeles River is located approximately one mile south of the project site. The site is in Zone C, an area determined to be outside the 500-year floodplain. Because the site is outside the 500-year flood plain, the hazard for flooding is negligible. Refer to Section 5.3.1.6.5 for a complete discussion.

4.1.2 Safety Precautions and Emergency Systems

Safety requirements and emergency systems will be included in the design and construction of the project to ensure safe and reliable operation and maintenance of project facilities. Monitoring systems and a well-planned maintenance program will enhance safety and reliability.

Safety, auxiliary, and emergency systems will consist of: required lighting; backup dc or ac electrical power for controls; fire suppression; hazardous materials containment safety systems; security systems; and natural gas, steam utilities, and chemical safety systems. The Project will include its own auxiliary electric and uninterruptible power supply (UPS) and compressed plant air and instrument air system. Fire suppression water and potable water will be supplied by the City of Burbank water system. The municipal water system is very reliable because of the number of pumps, a design that feeds from multiple directions, and a design that includes a gravity-feed system.

The LORS that are applicable or potentially applicable to the project in the context of the public and OSHA protection measures are addressed in Section 7.0.

4.1.2.1 <u>Safety Precautions</u>

4.1.2.1.1 <u>Worker Safety</u>. MPP programs will assure, at a minimum, compliance with federal and state OSHA program requirements. In addition to compliance with these programs, ongoing implementation of a Job Safety Analysis (JSA) program that effectively assesses potential hazards and mitigates them on a routine basis will protect employee safety.

A more complete discussion of worker safety is provided in Section 5.17.

4.1.2.1.2 <u>Hazardous Materials Handling</u>. Hazardous materials will be stored and used during construction and operation. Design and construction of hazardous materials storage and dispensing systems will be in accordance with applicable codes, regulations, and standards. Hazardous materials storage areas will be curbed or diked to contain spills or leaks. Potential hazards associated with hazardous materials will be further mitigated by implementing a hazards communication program and thorough training of employees on the proper identification, handling, and emergency response to spills or accidental releases. Emergency eyewashes and showers will be provided at appropriate locations.

Personnel protective equipment (PPE) will also be provided. A more detailed discussion of hazardous materials handling is presented in Section 5.15.

4.1.2.1.3 <u>Security</u>. The plant site is enclosed by a security fence. Access gates are provided as required. In addition to the perimeter security fence, the substation and transformer area is fenced and provided with access gates.

4.1.2.1.4 <u>Public Health and Safety</u>. The programs implemented to protect worker health and safety will also benefit public health and safety. Facility design will include controls and monitoring systems to minimize the potential for upset conditions that may result in public exposure to acutely hazardous materials. Potential public health impacts associated with operation of the project will be mitigated by development and implementation of an

Emergency Response Plan, an employee hazards communication program, a Spill Prevention Control Plan, safety programs, and employee training. The MPP will coordinate with local emergency responders by providing them with copies of the plant site Emergency Response Plan, conducting plant site tours to point out the location of hazardous materials and safety equipment, and encouraging these providers to participate in annual emergency response drills.

4.1.2.2 Auxiliary Systems

The proposed project includes centralized control and monitoring systems that will help ensure safe operation of the project facilities. Refer to Section 3.9 (Facility Operation) and Appendix D (Control Engineering Design Criteria) for more information.

4.1.2.3 Emergency Systems

4.1.2.3.1 Fire Protection Systems. The facility will include appropriate onsite fire protection systems and will be supported by local fire protection services included on the project site. Refer to Section 3.4.10 for a detailed description of the fire protection system.

Portable and fixed fire suppression equipment and systems will be included in the project. Portable fire extinguishers will be located at strategic locations throughout the project site. Smoke detectors, sprinkler systems, and fire hydrants with hoses will be utilized. Areas and equipment so recommended by NFPA will be protected by water spray or sprinkler systems. The combustion turbine (CT) enclosure will be protected by a CO_2 (or equivalent) suppression system.

Employees will be given fire safety training, including instruction in fire prevention, the use of portable fire extinguishers, and reporting fires to the local fire department. Employees will only suppress fires in an incipient stage. Fire drills will be conducted at least twice each year for each work area.

The City of Burbank Fire Department (COBFD)will provide fire protection and firefighting services to the project site. The City of Burbank Fire Chief will perform a final fire safety inspection upon completion of construction, and thereafter will conduct an annual fire safety inspection. Prior to startup, the City of Burbank Fire Department will be requested to visit the project site to become familiar with the site and with project emergency response procedures.

4.1.2.3.2 Medical Services and Emergency Response. The MPP will have an Emergency Response Plan. The Emergency Response Plan will address potential emergencies including chemical releases, fires, and injuries, and will describe emergency response equipment and its location, evacuation routes, reporting to local emergency response agencies, responsibilities for emergency response, and other actions to be taken in the event of an emergency.

Employee response to an emergency will be limited to an immediate response to minimize the risk of escalation of the accident or injury. Employees will be trained to respond to fires, spills, earthquakes, and injuries. A first aid facility with adequate first aid supplies and personnel qualified in first aid treatment will be provided onsite.

4.1.3 Aviation Safety - Power Generation Facility Stacks

There are no major airports in the immediate vicinity of the proposed MPP site. The Burbank/Glendale/ Pasadena Airport is located about 2.5 miles northwest of the proposed site and the Van Nuys Airport is approximately 10 miles west.. The Santa Monica Municipal Airport is 14 miles southwest of the proposed site.

Title 14, Part 77 of the CFR requires the filing of a Notice of Construction or Alteration (Form 7460) with the Federal Aviation Administration (FAA) (Air Traffic Division, Hawthorne, California) when an object is constructed or altered that is more than 200 feet above the ground level. The planned facility stack will be approximately 150 feet above ground level, therefore, the Notice of Construction or Alteration will not be required.

4.2 RELIABILITY AND AVAILABILITY

This section discusses the expected facility availability, equipment redundancy, ability to respond to varying utility needs for power, maintenance program, fuel availability, water availability, and project quality control measures.

4.2.1 Facility Availability

The MPP will employ a heavy-duty frame CT fueled by natural gas. CTs with natural gas firing have proven in the past 20 years to provide much higher availability than other types of power plants of comparable size. Generating plants with heavy frame CTs operating in continuous service have commonly demonstrated operating availability well above 90 percent over several years.

4.2.1.1 Range of Availability

Overall availability varies from year to year because of both random causes and the structure of the overhaul cycle. Forced unavailability changes somewhat from year to year because the numbers and lengths of forced outages vary. Planned unavailability varies also, but in a more predictable fashion because the overhaul cycle requires different amounts of downtime in different years. Typically, baseloaded CTs are overhauled on a six-year cycle with relatively short outages (on the order of one week to 10 days) in Years 1, 2, 4, and 5; a somewhat longer outage (on the order of two to three weeks) in Year 3; and a major outage (on the order of four to seven weeks) in Year 6. The CT work usually controls the planned outage length.

4.2.1.2 Basis for Forecasts of Availability

As indicated above, heavy-duty frame CTs have demonstrated availability factors of more than 90 percent.

4.2.1.2.1 Forced Outage Factor. Combined cycle units in continuous duty service with advanced technology CTs that have been available for some time have demonstrated an equivalent Forced Outage Factor (FOF) of 2.5 percent or less.

The balance-of-plant and support systems are assumed to have installed spare pumps typical of combined cycle plants now operating; the equivalent FOF associated with them is less than 0.5 percent. The demonstrated equivalent FOF for the steam turbine (ST) and balance-of-plant is 1.0 or less.

4.2.1.2.2 Planned Outage Factor and Maintenance Outage Factor. The Planned Outage Factor and Maintenance Outage Factor will include minor maintenance, off-line water washing, and planned maintenance outages. The planned outages are based on hours of operation (combustion inspection in Years 1, 2, 4, and 5; hot gas path inspection in Year 3; and major inspection in Year 6 for baseload units) and will involve disassembly of the CT to various degrees. Inspection duration will be dependent on the size of the maintenance crew and duration of work shifts. The experience with other similarly sized CTs includes planned outages and interim maintenance time with high confidence in the forecasts of time required for both planned outages and minor maintenance.

4.2.1.3 Degradation in Output from Fouling and Wear

All gas turbines degrade in output from their new and clean condition because of fouling and wear. “Nonrecoverable” degradation from equipment wear increases rapidly in the first few thousand fired hours and then slows.

At the MPP, most degradation due to wear will be recovered during the major overhaul conducted at the end of six years. Degradation due to fouling will be corrected by frequent on-line, and less frequent off-line, water washing. The ST will also degrade, but at a slower rate and with a smaller impact.

4.2.1.4 Summary of Availability

The MPP is expected to provide a high availability and be more responsive than most generation facilities to the needs of the system for power during periods of peak load. Its outage rates are expected to be low. Planned outages will be taken during off-peak periods.

4.2.2 Equipment Redundancy

The following sections identify equipment redundancy as it applies to project availability.

4.2.2.1 Combined Cycle Power Island

The proposed facility will consist of a dual-shaft, combined cycle power island. The power island will include a heavy-duty CT that transfers heat from the CT exhaust into a fired HRSG.

In a combined cycle configuration, steam from the HRSG drives a condensing reheat ST. The CT and ST are connected to their own generators by separate shafts (i.e., dual-shaft configuration). The CT will be equipped with an inlet air evaporative cooling system for use when the ambient temperatures exceed 50° F.

Failure of an HRSG, ST, feedwater supply, or steam delivery system will cause the CT to shut down since it is not designed to operate in the simple cycle mode.

4.2.2.1.1 Combustion Turbine. The CT subsystems will include the CT, inlet air-conditioning system, lube oil system, starting system, and CT control and instrumentation. Redundancy will be provided in CT subsystems where practical. For example, the lube oil system will consist of redundant pumps, filters, and coolers, but redundant bearings are obviously impractical. The microprocessor based control system will consist of redundant microprocessors as well as redundant sensors for critical measurements. Technological advancements, as well as redundancy as illustrated above, have led to very high reliability for the CTs considered for this project.

4.2.2.1.2 Steam Turbine. The ST subsystem includes the lube oil system and ST control and instrumentation. Redundancy will be provided in ST subsystems where practical. For example, the lube oil system will consist of redundant pumps, filters, and coolers. The microprocessor based control system will consist of redundant microprocessors as well as redundant sensors for critical measurements. Technological advancements, as well as redundancy as illustrated above, have led to very high reliability for the STs considered for this project.

4.2.2.1.3 Heat Recovery Steam Generator. The HRSG subsystems will include feedwater stop and check valves, steam stop valves, relief valves, continuous and intermittent blowdown valves, supplementary duct firing, catalytic NO_x emission reduction (SCR) system, and control instrumentation. Subject to final equipment selection, it is expected that the system will require high pressure (HP) and (low pressure) LP sections, each consisting of an economizer, evaporator, and reheat section.

4.2.2.1.4 Generators. The generator systems will include the excitation system and the generator control system. The MPP will contain two generators and their associated systems. The CT generator will be located on a common shaft with the CT. The ST generator will be located on a common shaft with the ST.

4.2.2.2 Balance-of-Plant Systems

The power island will be served by the following BOP systems:

Boiler Feedwater System. The condensate pumps (2 x 100 percent) will transfer feedwater from the condenser hot well to the LP drum. The boiler feedwater pump (2 x 100 percent) will provide water from the LP drum to the HP and LP sections of the HRSG. Makeup to this system will be produced from potable water onsite with mobile demineralization equipment.

Main Condenser. The main condenser condenses steam and cools and deaerates the condensate to a level suitable for introduction into the HRSG. It will be a single shell, two pass, nondivided water box condenser, with 316 stainless steel (SS) tubes. The tube surface will be designed with extra capacity for fouling and to permit plugging of leaking tubes so that complete repair can be accomplished during scheduled outages. The condenser air removal system will consist of steam powered air eductors and/or mechanical vacuum pumps for both hogging and holding of condenser vacuum. Redundant air removal equipment will be provided.

Cooling Tower and Circulating Water System. The cooling tower cools the circulating water and makes it suitable for cooling the main condenser and the auxiliary equipment. Three (33% capacity) circulating water pumps will supply cooling water to the main condenser. The cooling system will be designed for two of the cooling tower cells or one of the circulating water pumps to be out of service for maintenance without significantly affecting electrical output. The ST and CT can be operated at reduced loads if several of the cooling tower cells are out of service. There will be a total of six cells in the cooling tower structure.

Closed Cooling Water System. This system will provide water for cooling BOP components such as the air compressors and bearing coolers. Heat is rejected in the cooling tower. Redundant closed cooling water pumps and heat exchangers will be provided.

ST Cycle Makeup and Storage System. This system transfers water from a demineralizer to storage tanks and then to the condenser. The storage capacity in the demineralized water storage tank will provide feedwater makeup if the demineralized water supply is curtailed for a short time.

Compressed Air. The compressed air system supplies plant service air and dry compressed air at the required pressure and capacity for all instruments' air demands, including pneumatic controls, transmitters, instruments, and valve operators. The system will include two 100 percent capacity air compressors (one operating, one spare) and a 100 percent capacity, dual tower, desiccant air dryer with pre-filters and after-filters, an air receiver, instrument air headers, and distribution piping. The dual towers of the air dryer will not provide the usual effect of 100 percent redundancy because one will be unavailable much of the time while it undergoes regeneration.

4.2.2.3 Distributed Control System

The DCS will be a redundant microprocessor-based system which will provide control, monitoring, and alarm functions for plant systems and equipment for the power island. The following functions will be provided:

- Control the HRSG and other systems in response to unit load demands (the CT and generator have their own control systems).

- Provide control room operator interface.

- Monitor plant equipment and process parameters and provide this information to the plant operators in a meaningful format.

- Provide visual and audible alarms for abnormal events based on field signals or software-generated signals from plant systems, processes, or equipment.

- The DCS will have functionally distributed architecture comprising a group of similar redundant processing units linked to a group of CRT based operator workstations and an engineering workstation by redundant data highways. Redundant processors will be identically programmed to perform the specific tasks for control information, data acquisition, annunciation, and historical data storage. Because of this redundancy, no single processor failure will cause or prevent a unit trip.

4.2.3 Fuel Availability

The fuel for the MPP will be natural gas. A highly reliable supply of natural gas is available in the Los Angeles basin due to diversification of supply pipelines.

Acquiring competitively priced natural gas for delivery to the project over the long-term is a reasonable goal due to adequate gas supplies in the United States and Canada and the large amount of interstate transport capacity into California. Competition has expanded the available sources of gas supply, provided market liquidity, and has increased transportation access significantly over the past few years, and further improvements are anticipated. Implementation of FERC Order 636, the California Public Utilities Commission’s capacity brokering program, the separation of utility electric generation (UEG) from utility system gas supply, and the ongoing addition of new interstate pipeline capacity provide direct access to gas supplies, interstate transportation, and related services to all non-core customers.

4.2.3.1 Supply Access and Pipeline Capacity

California’s existing gas supply portfolio is provided by regionally diverse sources and includes supplies from California, traditional Southwest supply sources (the Permian, Anadarko, and San Juan basins), the Rocky Mountains, and Canada.

Additional pipeline capacity and open access will contribute to long-term supply availability. Pipelines serving California include Pacific Gas Transmission, El Paso, Transwestern, Kern River, and Mojave Pipeline Company. Pacific Gas Transmission supply would be accessed via the PG&E system. For the El Paso or Transwestern supplies, the SoCalGas or Mojave pipeline systems would be utilized for conveyance.

In summary, various large and diverse gas supplies and conveyance systems are currently available for supplying natural gas fuel to the proposed MPP and further improvements are anticipated. Fuel availability and reliability for the proposed project are considered to be adequate.

4.2.4 Water Availability

Water supply requirements for the MPP include reclaim and potable water from the COB Public Works Department treatment plants. The expected water requirements can be met by the existing supply system.

4.2.4.1 City of Burbank Reclaim Water Treatment Plant Effluent

The COB Public Works Department operates a reclaim water treatment plant that produces water of sufficiently clean quality to discharge into the Burbank Western Channel, a tributary to the Los Angeles River. The treatment plant has a capacity of 27 acre-ft per day but currently averages about 19 acre-ft per day. The average daily water consumption for cooling water is expected to be 17.1 acre-ft per day. The backup source of cooling water is the potable water supply on the site. Only in very extreme drought cases will there be less reclaim water than is needed by the new unit. Reclaim water is available through the water main that crosses the proposed site for the new unit.

4.2.4.2 City of Burbank Potable Water

Potable water will be used for human consumption, sanitary facility uses, and as the feed supply to the mobile demineralizer trailers to be installed at the MPP site. These trailers produce demineralized water needed in the combustion turbine and as makeup to the boiler feedwater cycle. Consumptive use of potable water for cooling purposes is limited to emergency situations. Potable water is available onsite through a six-inch water main that crosses the proposed site for the new unit.